

REMARKS

Claims 1 and 3-15 are pending in the application and are rejected. The rejection is final.

Applicant requests entry of the amendments set forth above that cancel apparatus claims 1, 3, 4 and 8-11, and requests reconsideration of the remaining method claims 5-7 and 12-15.

On November 2, 2004, Examiner Wong conducted a telephone interview (referred to herein as the “Interview”) with the undersigned attorney. Supervisory Patent Examiner John Lee also attended the Interview. During the Interview, the undersigned attorney explained the invention as claimed and contrasted it with the teachings of the prior art of record, as summarized below.

An agreement was reached during the Interview that, in view of the reasons explained below, Applicant has successfully traversed the rejection of method claims 5-7 and 12-15.

Claims 5-7 and 12-15 are rejected under 35 U.S.C. § 103 as being unpatentable over U.S. patent 6,741,778 (referred to herein as “Chan”) in view of U.S. patent 5,383,118 (referred to as “Nguyen”). The Office Action indicates Chan discloses all that is claimed except “image recognition as an alignment means”; that known passive alignment techniques include image recognition such as that disclosed in Nguyen; and that it “would have been obvious ... to a person having ordinary skill in the art to recognize that image recognition is a widely known technique for passive alignment of devices to keep optical losses to a minimum.”

Applicant respectfully traverses the rejection of these method claims for each of two reasons discussed below.

No Motivation to Combine

First, Applicant traverses the alleged motivation. Whether a particular alignment technique is well known is, by itself, not a sufficient showing to make out a *prima facie* case of obviousness. The Office Action does not show anything in the prior art that suggests or motivates a person of ordinary skill to modify the teachings in Chan. (Applicant believes it was the Examiner’s intention to have the Office Action state it would have been obvious to modify the manufacturing processes shown in Chan by incorporating the alignment technique shown in Nguyen.)

Because the optical alignment technique disclosed in Nguyen was known long before the Chan reference was filed as an application, the fact that Chan does not expressly teach or suggest using this or another optical alignment technique strongly implies it was not obvious to incorporate

such a technique into the processes disclosed in Chan. The Office Action does not provide any reason that overcomes this implication. Instead, as will be shown below, Chan teaches away from using the optical alignment technique disclosed in Nguyen.

Chan discloses several embodiments of an optical package in which pins or pads are used for both assembly and alignment of component parts. In particular, Chan discloses the following:

The method of manufacturing the optical package 10 includes the steps of providing an optical coupler housing 12 comprising at least two alignment pins 14 and 16 The alignment pins 14 and 16 are used to align the optical coupler housing 12 (col. 5 lns. 39-44)

With respect to Fig. 4a, the optical coupler 12 comprises both optical fibers 24 and alignment pins 14 and 16, which are accurately positioned relative to each other in an optical lithographic process The optical coupler 12 is thus attached to the substrate 30 by means of alignment pins 14 and 16. ... It is the mating of the optical coupler 12 to the substrate 30 and the substrate 30 to the device 32 that aligns the optical fibers 24 to the active optical device 32 in the optical package 10 (col. 5 ln. 53 to col. 5 ln. 2)

With respect to Fig. 4b, once again, the optical coupler 12 comprises both optical fibers 24 and constructed pads 14' and 16', which are accurately positioned relative to each other via an optical lithographic process. ... The active optical device 32, by itself, is aligned with the optical fibers 24 in the optical coupler 12 by solder ball reflow of the coupler/substrate sub-assembly and the chip/substrate sub-assembly. (col. 6 lns. 7-19)

With respect to Figs. 4c and 4d, the optical coupler 12 comprises constructed pads 18 and 20 interleaved with optical fibers 24. The optical fibers 24 and precision constructed pads 18 and 20 are accurately positioned relative to each other by optical lithographic means. ... Alignment pins 14 and 16 [are optional because] the constructed pads 18 and 20 can also provide structural support, as well as locating and aligning functions. (col. 6 lns. 20-30)

There is no suggestion and no obvious motivation to incorporate the optical alignment technique of Nguyen into the manufacturing processes of Chan. On one hand, there is no obvious reason to **supplement** the pin/pad alignment processes of Chan with the optical alignment technique of Nguyen because the processes disclosed in Chan are apparently adequate. On the other hand, there is no obvious reason to **substitute** the optical technique of Nguyen for the pin/pad alignment processes of Chan because the pin/pads in Chan provide both structural as well as alignment functions. According to Chan, alignment is achieved by surface tension of solder or other conductive adhesive liquid (see col. 3 lns. 8-10; col. 4 lns. 32-34; col. 5 lns. 8-9 and 25-26).

Because the pin/pads in Chan provide for alignment, the pin/pad features either would prevent the Nguyen alignment technique from being used or their structural function would be impaired or possibly destroyed by any shifts in position required by the Nguyen alignment technique.

Not All Claim Features Are Taught By the Combination

Second, even if it would have been obvious to incorporate the alignment technique of Nguyen into the manufacturing processes of Chan, the resulting combinations do not disclose or suggest all features of the invention as claimed.

With regard to independent method claims 5 and 12, the claimed methods include steps similar to the following (this is an abbreviated description of the steps in claim 5):

- (a) mounting optical elements on a substrate;
- (b) passively aligning the optical elements mounted on the substrate with first ends of optical fibers exposed at a first surface of an optical fiber array by image recognition thereof, where second ends of the optical fibers are exposed at a second surface of the optical fiber array that is opposite to the first surface; and
- (c) mounting the optical fiber array at the second surface to the substrate with at least one spacer interposed.

Nguyen teaches an alignment technique that uses cameras or other image-forming devices to establish relative positions of an optical device and an end of an optical fiber that are each carried by separate tables or surfaces that can be moved relative to one another. The positions of the optical device and the ends of the optical fibers nearest the optical device are established (col. 3 lns. 30-60). After establishing the positions, a table or surface is moved to bring the optical device and optical fiber into alignment (col. 3 lns. 61-68).

As indicated in the Office Action, Chan does not disclose or suggest anything with regard to a passive optical alignment technique. In addition, the processes disclosed in Chan require precise alignments in multiple steps in contrast to what is claimed.

Neither Chan nor Nguyen disclose or teach using image recognition to align optical elements (emitting or receiving elements) with the ends of optical fibers that face away from the optical elements. In contrast, Nguyen teaches aligning an LED with the end of an optical fiber that faces toward the LED.

All other claims are dependent on either claim 5 or claim 12 and add further limitations that are not disclosed or suggested by the cited art.

CONCLUSION

Applicant requests cancellation of the apparatus claims as shown above and requests reconsideration of the remaining method claims in view of the discussion set forth above.

Respectfully submitted,



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I certify that this Response to Office Action and any enclosed materials are being deposited with the United States Postal Service on November 3, 2004 with sufficient postage as first class mail in an envelope addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450..



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